

Remarks

Reconsideration of this Application is respectfully requested.

Claims 39-43 and 61-78 are pending in the application, with 39, 61, 66, and 67 being the independent claims. Based on the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn. Additionally, Applicants reserve the right to appeal.

Rejections Under 35 U.S.C. § 103

On page five of the Office Action, the Examiner rejected claims 39-41 and 68-78 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,285,352 to Pastore et al. (hereinafter Pastore) in view of U.S. Patent No. 6,011,304 to Mertol (hereinafter Mertol). Applicants respectfully traverse these rejections and request that they be withdrawn.

Claim 39 recites, among other features, "a stiffener that has a first surface attached to said second surface of said substrate, wherein said stiffener further has a second surface having a mounting location for an integrated circuit (IC) die." Pastore does not describe a stiffener that has a first surface attached to a second surface of a substrate, as recited in claim 39. As stated in a response filed at the USPTO on February 3, 2004, Applicants respectfully disagree with the Examiner's characterization of metallized area 37 of Pastore as a stiffener. Applicants again assert that metallized area 37 is not a stiffener, as recited in claim 39. As stated by Pastore:

Device 35 of FIG. 2 includes semiconductor die 12 mounted over a plated, metallized area 37 formed on the top surface of substrate 14.

Metallized area 37, like traces 18, will usually include two layers, a

laminated conductive layer with an overlying plated conductive layer.

(Col. 5, line 68-Col. 6, line 6).

Thus, Pastore describes metallized area 37 as structurally trace-like, having two layers like traces 18. Pastore describes the fabrication process for traces 18 as follows:

Conductive traces 18 and pads 24 are typically formed on substrate 14 by laminating a conductive foil, usually copper, to the substrate. Traces and pads are defined by patterning the foil using lithography techniques.

Alternatively, traces and pads may be screen printed or otherwise deposited onto surfaces of the substrate. Both the conductive traces and pads are typically plated with gold to establish a non-oxidizable surface for bonding wire bonds 20 and attaching solder balls 26. Thus, the traces and pads will typically include two layers.... (Col. 4, lines 45-55).

Thus, Pastore describes a conventional substrate trace or die flag fabrication process. Pastore teaches forming traces 18 using two layers, as well as presumably forming metallized area 37 this way. As described in Pastore, the first layer is a "conductive foil" laminated to the substrate. This foil is patterned "using lithography techniques" to form traces 18, and presumably metallized area 37. Traces 18 and metallized area 37 are then plated "to establish a non-oxidizable surface" for wire bonds and solder balls. However, nowhere does Pastore teach forming metallized area 37 as a stiffener, as recited in claim 39. A metallized area 37 fabricated according to the process described above of Pastore would not "inherently impart stiffening qualities upon the device package" as suggested on page two of the Office Action. Rather, metallized area 37 would be inherently flexible and thin like a trace.

Furthermore, Pastore states, "Although ideally, at least from a device performance point of view, both metallized areas should be made as large as possible, other considerations will govern the size and layout of the metallized areas." (Col. 6, lines 41-44). However, Pastore is referring to the area of metallized area 37 as opposed to the thickness of metallized area 37 being "as large as possible." Nowhere does Pastore indicate that a thickness of metallized area 37 is being referred to. In fact, Pastore states, among other things, that "the metallized areas should not unduly restrict the routing of conductive traces and position of solder balls" (see col. 6, lines 47-49), which implies that Pastore is referring to the area of metallized area 37 (i.e., the larger the area of metallized area 37, the less room there is for conductive traces).

Thus, Pastore does not teach or suggest a stiffener that has a first surface attached to the second surface of a substrate, as recited in claim 39. Furthermore, Applicants assert that Mertol does not provide the teachings missing from Pastore. Accordingly, Applicants assert that independent claim 39 is patentable over Pastore and Mertol for at least these reasons.

Claims 40, 41, and 68-78 depend from claim 39, and are also patentable over Pastore in view of Mertol for at least the same reasons described above, and further in view of their own features. Applicants therefore request that the Examiner withdraw the rejection of claims 39-41 and 68-78.

On page eight of the Office Action, the Examiner rejected claims 42, 43, 75, and 78 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Pastore in view of Mertol, as applied to claims 39-41 above, and further in view of U.S. Patent No.

6,552,266 to Carden (hereinafter Carden) or U.S. Patent No. 5,998,241 to Niwa (hereinafter Niwa).

Claims 42, 43, 75, and 78 depend from claim 39 and are patentable over Pastore in view of Mertol for at least the reasons described above with respect to claim 39 and further in view of their own features, and Applicants assert that Carden or Niwa do not supply the missing teachings. Applicants therefore request that the Examiner withdraw the rejection of claims 42, 43, 75, and 78.

Other Matters

On pages three and four of the Office Action, the Examiner withdrew claims 71-74 from consideration as allegedly being directed to an invention that is independent or distinct from the invention originally claimed. Applicants respectfully traverse.

Applicants filed claims 1-13 on November 30, 2001. Claim 10 was directed to, among other features, a heat slug that includes a surface bump, a stiffener that includes a surface slot, and a locking mechanism formed by the surface bump and the surface slot. Thus, the originally filed claims did not identify a "first portion" and "a second portion" of a locking mechanism.

Applicants filed a Preliminary Amendment on June 17, 2002, in which Applicants cancelled claims 1-13, and presented new claims 14-67. Claim 40 is directed to, among other features, a locking mechanism having a first portion that includes a slot in a stiffener, and a second portion that includes a surface bump on a heat slug. Claim 42 is directed to, among other features, a locking mechanism having a first portion that includes a surface bump on a stiffener, and a second portion that includes a slot in a heat slug. Thus, claims 40 and 42 identify a "first portion" of a locking mechanism having

either a slot or a surface bump on a stiffener, and a "second portion" of a locking mechanism having either a slot or a surface bump on a heat slug. Accordingly, claims 40 and 42 do not "require the bump on the FIRST portion and the slot on the SECOND portion," as suggested on pages three and four of the Office Action.

Applicants filed a Reply to Restriction Requirement and Election of Species on April 11, 2003, in which Applicants elected to prosecute claims 11-43 of Invention I directed to a semiconductor device. Applicants filed a Reply to Second Restriction Requirement and Election of Species on August 29, 2003, in which Applicants elected to prosecute claims 39-43 of Species 3. Accordingly, neither claim 40 nor claim 42 was withdrawn from consideration as a non-elected invention.

Applicants filed an Amendment and Reply Under 37 C.F.R. §1.111 on February 3, 2004, in which Applicants presented new claims 71-74. Claims 71-74 are directed to, among other features, a locking mechanism having a first portion that consists of a slot in a stiffener, and a second portion that consists of a surface bump on a heat slug. Thus, claims 71-74 are similar to claim 40, and Applicants assert that they should be examined together. Therefore, Applicants request that claims 71-74 not be withdrawn from consideration.

On page four of the Office Action, the Examiner advised Applicants that should claims 40 and 41 be found allowable, claims 71 and 74 will be objected to under 37 C.F.R. § 1.75 as being a substantial duplicate thereof. The Examiner further advised Applicants that should claims 42 and 43 be found allowable, claims 75 and 78 will be objected to under 37 C.F.R. § 1.75 as being a substantial duplicate thereof. Applicants respectfully traverse.

Applicants assert that claims 71 and 74 are not substantial duplicates of claims 40 and 41, respectively, because they differ in scope. MPEP § 706.03(k). Claims 40 and 41 are directed to, among other features, a first portion of a locking mechanism that "includes" a slot in a stiffener, and a second portion of the locking mechanism that "includes" a surface bump on a heat slug. Claims 71 and 74 are directed to, among other features, a first portion of a locking mechanism that "consists of" a slot in a stiffener, and a second portion of the locking mechanism that "consists of" a surface bump on a heat slug.

Likewise, Applicants assert that claims 75 and 78 are not substantial duplicates of claims 42 and 43, respectively, because they differ in scope. MPEP § 706.03(k). Claims 42 and 43 are directed to, among other features, a first portion of a locking mechanism that "includes" a surface bump in a stiffener, and a second portion of the locking mechanism that "includes" a slot on a heat slug. Claims 75 and 78 are directed to, among other features, a first portion of a locking mechanism that "consists of" a surface bump in a stiffener, and a second portion of the locking mechanism that "consists of" a slot on a heat slug.

Thus, the locking mechanism described by claims 71, 74, 75, and 78 is directed to a single surface bump and a single slot. Accordingly, Applicants assert that claims 71, 74, 75, and 78 are substantially different from claims 40-43, which do not exclude locking mechanisms having more than one surface bump and more than one slot. Therefore, Applicants request that should claims 40-43 be found allowable, claims 71, 74, 75, and 78 should not be objected to under 37 C.F.R. § 1.75 as being substantial duplicates thereof.

On page nine of the Office Action, the Examiner provisionally rejected claims 39-43 under the judicially created doctrine of double patenting over claims 1-45 of copending Application No. 10/284,166, claims 1-12, 22, and 24-32 of co-pending Application No. 10/284,312, and claims 14-22 of copending Application Nos. 10/201,309, 10/284,371, 10/200,336, 10/201,893, 10/201,891, 10/197,438, and 09/742,366. Applicants acknowledge that the Examiner will hold these double patenting rejections in abeyance until such time that allowable subject matter is indicated.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

A handwritten signature in dark ink, appearing to read "Jeffrey S. Weaver", is written over a horizontal line.

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